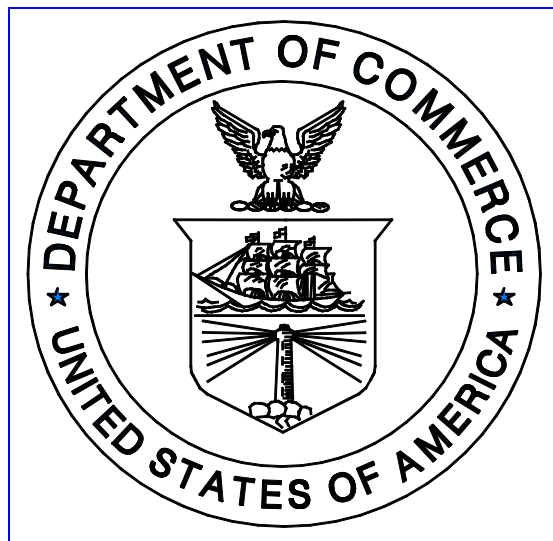


The Road Ahead for the U.S. Auto Industry



**Office of Automotive Affairs
Transportation and Machinery
International Trade Administration
U.S. Department of Commerce
April 2002**

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Summary

In 2001, U.S. sales of new light vehicles¹ declined from the previous year's record of 17.3 million units to 17.1 million, capping five years of progressively higher volumes with a 1.2% decline. Nonetheless, it was the second highest total on record. Many industry analysts expect that sales this year will register between 15.5 million and 16 million units. While this represents a decline of 6% to 9% over last year, it also reflects remarkably robust demand, especially given the events of last September and the state of the economy. Local production could grow by 2%, fueled by efforts to rebuild depleted inventories. Some manufacturers will reduce their U.S. capacity, while others will continue with expansion plans already underway. The total value of light vehicle imports during 2002 probably will continue to grow rapidly, increasing by about 10%. Export values most likely will hold to their current levels, resulting in an estimated 12% increase in the motor vehicle trade deficit to \$111 billion.

Sales slipped – but only a little

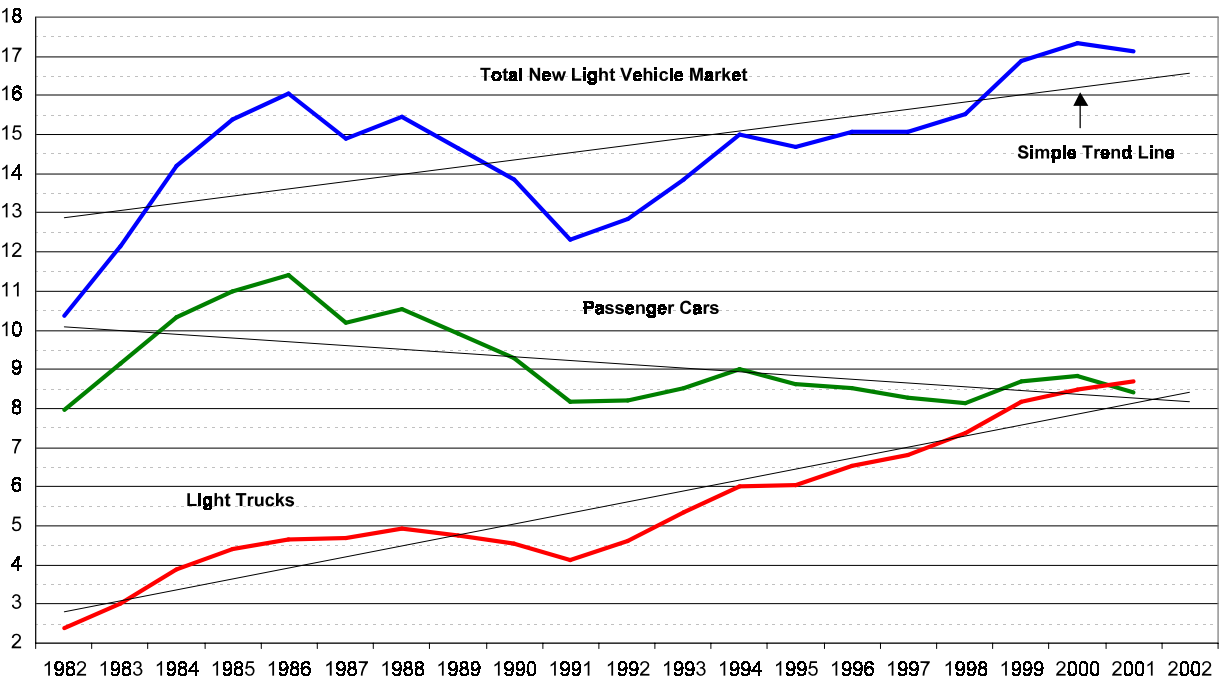
The U.S. market fell 1 percent last year from a record high, a remarkable performance. (See Chart 1.) In fact, sales actually had begun to decline as early as October of 2000 and had continued to decline throughout the first half of 2001. By August of last year, sales were off a cumulative 4.8% and analysts had begun to speak of year-end sales totaling no more than 16.5 million units. Then came September 11. Light vehicle production was interrupted almost instantly because of border crossing delays that held up rigidly scheduled hourly deliveries of parts from Canada and Mexico. Sales in the immediate aftermath plunged to recessionary levels. By the end of September, sales for the month were down 13% compared with September 2000. Year-to-date sales dropped by nearly 6%. The industry responded quickly, overcoming its supply-line delays and reviving showroom traffic by offering three-year zero-percent financing and extended warranties. October sales rocketed ahead to total 1.7 million units, the highest ever recorded for that month. Sales over the

¹ Automobiles, station wagons, vans with not more than 15 passenger capacity, sport and cross utility vehicles, and pickups. All rated at not more than 10,000 pounds of gross vehicle weight.

The U.S. market for new light vehicles has increased by 65% since 1982, but growth has come only from the light truck sector.

Chart 1

Millions of Units



Source: Automotive News 100-Year Almanac, 1996 ; and Ward's AutoInfoBank

final quarter grew at a rate that, if applied to the entire year, would have produced an annual total of 18.6 million units.

The actual total, 17.1 million vehicles, was the second highest on record. But in value terms, a record was set. The Commerce Department's Bureau of Economic Analysis (BEA) estimates that consumers spent \$243 billion on new cars and light trucks during the year, an 11% gain from 2000 and a new high. Light vehicle production volume fell nearly 10% to 11.2 million units last year, the lowest annual total since 1993. Primarily, this was the result of imports taking a larger share of the market, but production also was affected by local manufacturers aggressively reducing inventories to match their shrinking demand, rather than allowing stockpiles to accumulate. By the end of 2001, sales of imports from outside of the region² accounted for 18% of the market. This was the highest level since 1986, when they held an even larger 26% share.

² The industry includes sales of vehicles made within the North American Free Trade Area [NAFTA] as "domestic" vehicles. Everything else in industry sales data is an "import." The industry defines an "import brand," as any line other than those of GM, Ford, or the Chrysler Group. Import brands include vehicles they produce in the United States. Note, however, that U.S. government trade data counts all vehicles made in Canada and Mexico in its import tally ("true imports") for determining the balance of trade with other countries.

Chart 1 points out two other salient features of the market. First, passenger car sales have fallen nearly to 1982's level, while light truck sales have increased significantly and now account for the majority of the market. Second, the overall market may have reached either a new plateau – or the apogee of a market cycle that could lead steeply downward for several years. Most industry analysts favor the more benign interpretation; expecting 2002 sales to fall to no lower than 15.5 million units. In fact, sales over the first two months of this year have been encouraging, slipping just 4% from the same period last year to 2.4 million units. No doubt, falling vehicle prices,³ and falling interest rates that have lowered not only the cost of home mortgages, but also reduced finance charges on new vehicles, play a role in these results. Also helping has been the net increase in consumers' disposable personal income.⁴ These developments, coupled with BEA's estimates that the nation's fourth quarter GDP grew much more robustly than initially estimated, plus Labor Department reports of strong fourth quarter productivity growth, as well as significant employment gains in the first two months this year,⁵ has led many analysts and economists to declare the recession at an end. Several forecasters now predict that 2002 sales may decline by no more than 6% for the entire year, producing a market in the 16 million unit range.

A difficult year over – another one just beginning

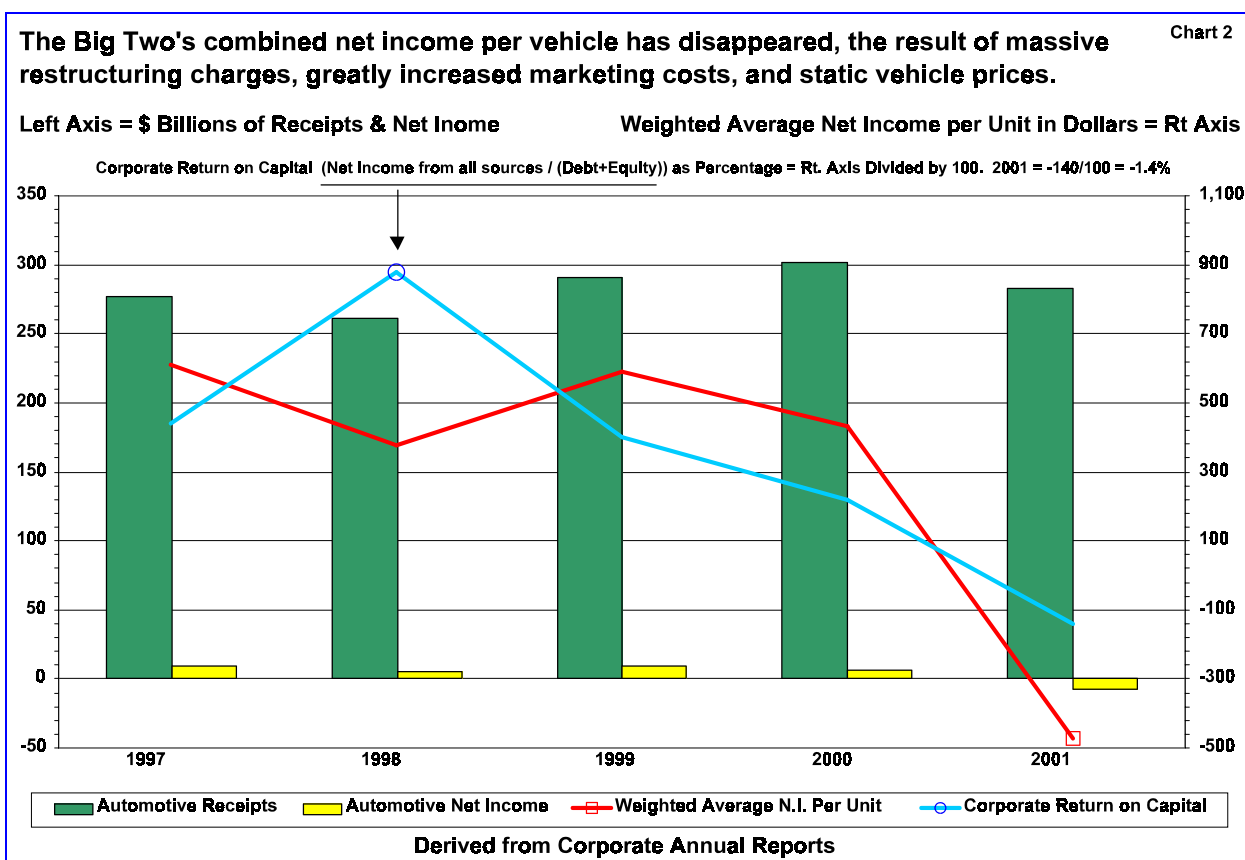
General Motors and Ford Motor Company, the only remaining U.S.-owned automakers, are the two largest auto manufacturers in the United States and in the world. In 2001, these “biggest two” sold 4.8 million and 3.7 million units, respectively, at home. GM sold an additional 3.2 million vehicles abroad; Ford, 3.3 million units. Between 1997 and 2001, the two firms generated net income totaling \$23.6 billion from their global automotive operations and revenues that reached an aggregate of \$1.4 trillion. (Chart 2)

2000 produced the biggest two's greatest revenue, \$302 billion, but 1997 generated the highest profit, \$ 9.6 billion. In 2001, stiff competition, declining or stagnant markets, and rising marketing costs all around the globe, but especially at home, conspired against them. They ended the year with a combined loss on global automotive operations of \$7.4 billion. Revenues declined 6% to \$283 billion. Unfortunately, they lost an average of nearly \$500

³ The CPI for new cars fell to 138.9 in 2001, from a height of 141.7 in 1997. The index for new trucks was 150.7, down from 1999's high of 152.0.

⁴ Commerce's BEA reports that total Disposable Personal Income reached \$7.4 trillion in 2001, up 5.5% percent for the year. On a per capita basis, DPI averaged \$25,944, up 4% in current dollars. The gain in constant dollars was 2.3%.

⁵ BLS now preliminarily estimates GDP growth at 1.4% in “real,” (i.e., excluding inflation) constant dollar terms and at 1.1% in current dollars. The original “advance” estimate was just 0.2% in real dollars, and a negative 0.1% in current dollars. Labor reports 4th quarter business sector productivity rose 5.1%. Output gained 1.3%, while hours worked fell 3.6%. Unemployment declined from 5.6% in January to 5.5% in February. Also, for the first time in seven months, employment outside the farm sector increased by 66,000 jobs.



for each vehicle they produced. Their combined corporate return on capital (i.e., including all non-automotive operations and non-repetitive events) declined from a peak of 8.8% in 1998 to a negative 1.4% in 2001.

Chrysler Corporation was the third largest participant in the American market last year, selling 2.3 million units here, plus an additional 500,000 units abroad. The firm became the Chrysler Group in 1998 when Daimler-Benz AG, the German registered parent of Mercedes Benz, acquired it and formed DaimlerChrysler AG.

This year promises to be difficult for all three firms. Each is struggling not only to increase sales, but also to reduce overhead by eliminating excess capacity, reducing material costs, and shrinking their payrolls. GM trimmed its North American salaried workforce by 3,000 in 2001 through early retirement incentives and normal attrition. It also laid off nearly 6,000 of its 16,000 contract workers. An additional 5,000 salaried positions are expected to be cut this year. Starting this April, GM will begin cutting 3,000 hourly positions at two U.S. plants, Orion Township, MI (cars) and Linden, NJ (light trucks), by eliminating one assembly shift from each. Under the terms of the current contract with the United Auto

Workers, laid-off hourly workers will receive 95% of their pre-tax pay for up to 42 weeks. If not recalled after that period, workers are placed in a jobs bank, receiving 100% of their pay until the UAW contract expires in September 2003. Many observers expect that when the contract expires, GM will close at least three North American plants; possibly including the two mentioned above and the Ste. Therese, Quebec, car plant. GM reported a loss of \$1.2 billion in 2001 on automotive revenue totaling \$151.5 billion.

Despite these problems, GM launched assembly operations this January in the first new U.S. plant it has built since turning over earth to create its Saturn assembly plant in Tennessee, 15 years ago. Built at a cost of \$560 million, Lansing Grand River, MI will preserve 1,500 of the 6,500 jobs that are threatened by the possible later closing of GM's nearby small-car plants. A second new plant, under development since 2000 in the nearby Delta Township – and expected to cost \$1 billion when completed – is tentatively scheduled to open in 2006. In 2000, GM started building a new light truck assembly plant adjacent to existing facilities in Shreveport, LA. Costing an estimated \$700 million when completed, the plant is expected on line in time to produce 2003 model-year light trucks.

Ford's worldwide restructuring plan, announced late last year, will eliminate 35,000 positions and could close as many as five plants. North American reductions include 5,000 salaried workers and 12,000 hourly positions. While still planning to invest \$20 billion in North America over the next 5 years, the firm says it has decided to eliminate 1 million units – nearly 16% – of its U.S. production capacity. Over the next two years, it has targeted the closing of three light truck plants: Edison, NJ; St. Louis, MO; and Oakville, in the Canadian province of Ontario. Ford currently has no new products scheduled for two other light truck plants: Avon Lake, OH and Cuautitlan, Mexico. Ford booked a restructuring charge of \$4.1 billion in the last year's final quarter to cover the cost of its restructuring. This contributed significantly to its total loss for the year of \$6.3 billion. Ford's \$2 billion renovation of its historic Rouge, MI facility is on schedule for completion in 2003.

DaimlerChrysler announced a restructuring plan early last year for the Chrysler Group that has already eliminated 16,800 positions. An additional 9,000 jobs are expected to be cut by the end of 2003. The plan includes a \$12 billion reduction in Chrysler's current 5-year capital spending program, leaving it with \$30 billion to invest in new vehicle programs. Also targeted is a \$1.8 billion cut in payments to its suppliers, on top of the \$3.3 billion reduction already secured. Chrysler opened a new \$1.2 billion light truck plant in Toledo, OH in 2001, but reportedly may close another plant in Detroit this year. It is also expected to sell between three and five parts plants to raise cash and lower its costs. Chrysler

Group's 2001 operating loss, reportedly \$1.9 billion, included a \$2.7 billion one-time charge for its restructuring plan.

American shares slip while the market shifts

The U.S. market is shifting in a number of ways. Light trucks, or vehicles classified as light trucks,⁶ now dominate the market. In 1981, these vehicles – mostly, ordinary pickups – supplied only 19% of the market. In the subsequent two decades, the light truck share of the total market increased every year until it reached 51% in 2001 – a volume that was 272,000 units above the total for automobiles. A 55% share by 2005 seems feasible. While light trucks didn't begin to outsell cars until last year, data developed by BEA shows that total consumer spending on trucks began to exceed that of cars in 1999. Dollar sales that year totaled an estimated \$104 billion for trucks and \$98 billion for cars. In 2001, the totals were \$135 billion and \$108 billion, respectively.

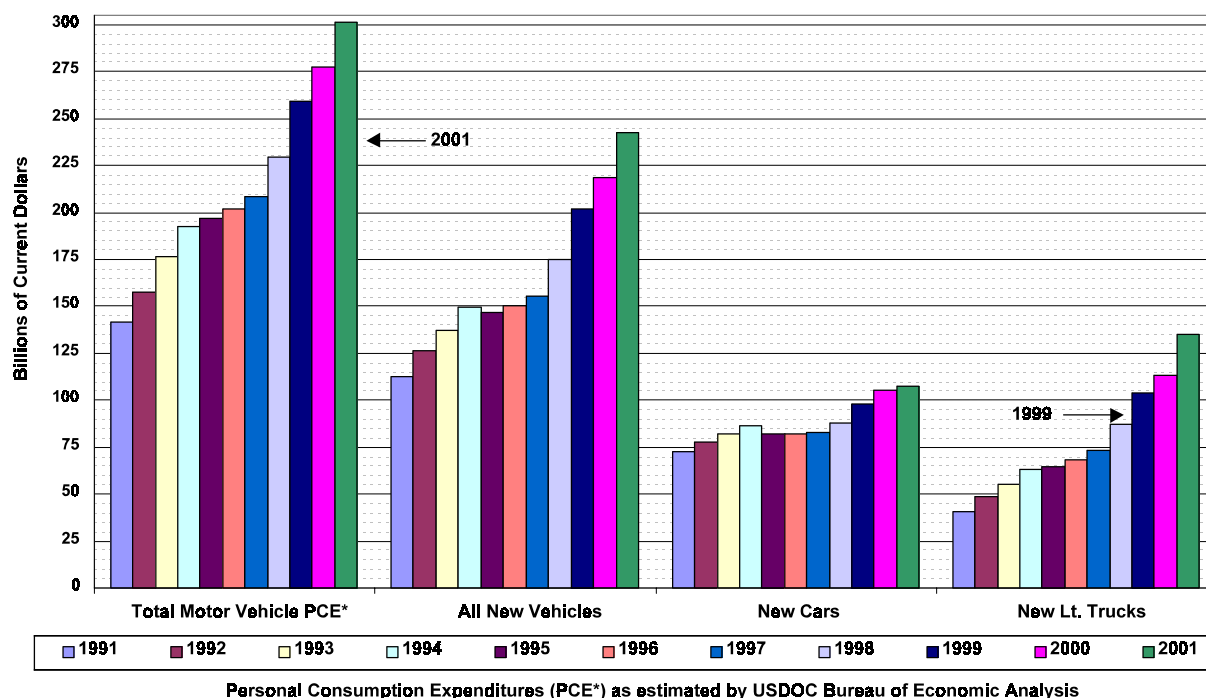
BEA's data in Chart 3 confirm something else that the manufacturers know. First, consumer spending for passenger cars is rising slowly (up 49% since 1991), but the amount they are spending on light trucks has been accelerating much more rapidly (up 230%). Secondly, consumers are willing to spend far more for the average light truck than for the average passenger car. In fact, light truck profits that exceed \$10,000 per unit are not uncommon, and easily explain why almost all manufacturers are rushing new offerings to market. No wonder, when small car profits (before incentives are subtracted) are less than \$1,000 per unit – for those few firms that can produce and market them efficiently. Manufacturers that previously have never offered a truck, and whose brand heritage would seem to suggest that they really shouldn't, have been jumping in with both feet and meeting with success.

This development has significant implications for GM, Ford, and Chrysler Group, as they have derived an ever increasing share of their sales and profits from the light truck sector. In 1986, they sold 3.7 million light trucks. That volume represented 79% of the entire light truck market, but just 31% of the three's total sales. The American brands raised their share of the sector to a peak of 86% in 1995. However, the 5.2 million units they sold that year also represented 49% of their total volume. In 2001, their dependence on the sector was even greater. They sold 6.7 million light trucks, good for just 77% of the sector, but equal to 62% of their total volume. Their shares have slipped in each of the sector's segments. In

⁶ Just what is a light truck? The category includes vans, pickups, sport utility vehicles built on truck platforms, and "cross-over" utilities based on car platforms. Cross-overs are designed to look truck rugged, but to ride like cars. Light trucks have a gross vehicle weight not exceeding 10,000 pounds.

Consumers' average expenditures for each light truck were greater than for cars in every year between 1991-2001. This chart shows, however, that the total amount spent by consumers for light trucks did not exceed the total spent for cars until 1999.

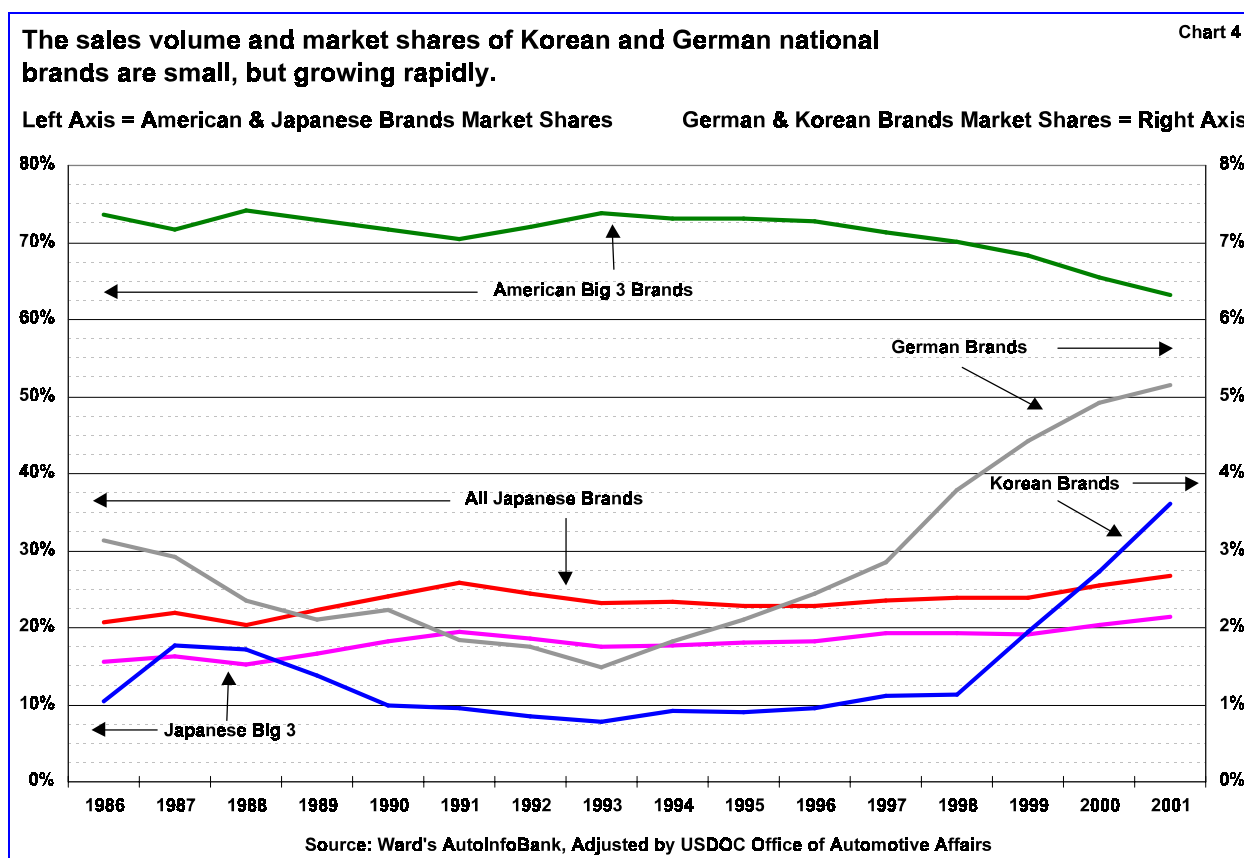
Chart 3



1986, American brands accounted for 58% of the pickup segment, 94% of vans, and 83% of all SUV sales. In 2001, their shares were 36%, 80%, and 72%, respectively.

American brands also have been losing volume and market share in the passenger car segments. They supplied 72% of the passenger car market in 1986 on a volume of 8.2 million units. Last year, they sold 4.1 million cars, a 49% share of the market. They have lost share in each of the passenger car segments, save one. American brands accounted for 69% of all small cars in 1986, but just 43% in 2001. Their share of mid-sized cars has slipped from 70% to 52%, while their luxury car share fell from 58% to 32%. The only bright spot for the American brands has been the fourth category, large passenger cars, where they retain 100% dominance. Unfortunately, large car sales declined across the period, falling by 58% to 548,000 units.

Sales in 2001 in all segments of the passenger car and light truck sectors produced the lowest overall U.S. market share on record for the American Big 3 – 63%. This was a decline of 2 percentage points from the previous year, which also had declined from the year before. In fact, as Chart 4 shows, the Big 3's overall share has declined steadily since their recent peak



of 73% in 1996. Many industry observers expect further slippage in the Big 3 share for the next several years. They take note of the heavy schedule of new “import” models that are expected to be introduced, not just in the passenger car segments, but especially in light trucks, and observe that this proliferation of new offerings is probably not going to be matched by the Big 3. They also note that even though the initial product quality of Big 3 vehicles has risen significantly over the past decade, they still trail the Japanese Big 3, who also have continued to improve.

Most of the sales that the American Big 3 have been losing in light trucks has accumulated to the benefit of the Japanese brands. Japanese light truck volume increased 8% to a total of 1.8 million units in 2001, producing a 20% share of the truck market. This was nearly the same as their 21% share in 1986, but well above their 1996-97 share of 13%. Their share of the passenger car segments also has increased, rising from 21% in 1986 to 34% last year. Combined with their light truck sales, the Japanese share of the U.S. market (including vehicles made in the United States) has moved significantly higher since 1986, growing by 6 percentage points to 27% in 2001.

Sales and shares of German brands (including Mercedes, excluding the Chrysler Group) also are growing sharply. Their share of car sales increased from 4% to 9% between 1986 and 2001, on a volume that rose from 492,000 units to 783,000 vehicles. German truck sales in 1986 (12,300 units) barely registered, accounting for just 0.3% of the sector. Their 2001 share was 1%, on a volume of 99,000 units. Overall, the German share of the entire light vehicle market has grown from 3% to just over 5%.

It is the Korean brands, however, that are rocketing ahead. Bolstered by the lowest prices, the longest warranties (except for one SUV offering from Isuzu), and by new products with improved capabilities, Korean car and light truck sales have increased sharply. In 1986, their total volume was 169,000 units, 1% of the market. In 2001, sales totaled 618,000 units – an increase of 265% – and a share of nearly 4%. Sales of passenger cars have nearly tripled since 1986, reaching 495,000 units. This produced their highest share of the car market – 6%. Even more impressive has been the growth rate in sales of Korean light trucks. Korean brands sold 8,000 units in 1995. Six years later their volume reached 123,500 units, which increased their share of the sector from 0.1% to 1.4%. Their 2001 volume was 70% larger than the year before.

The industry evolution continues

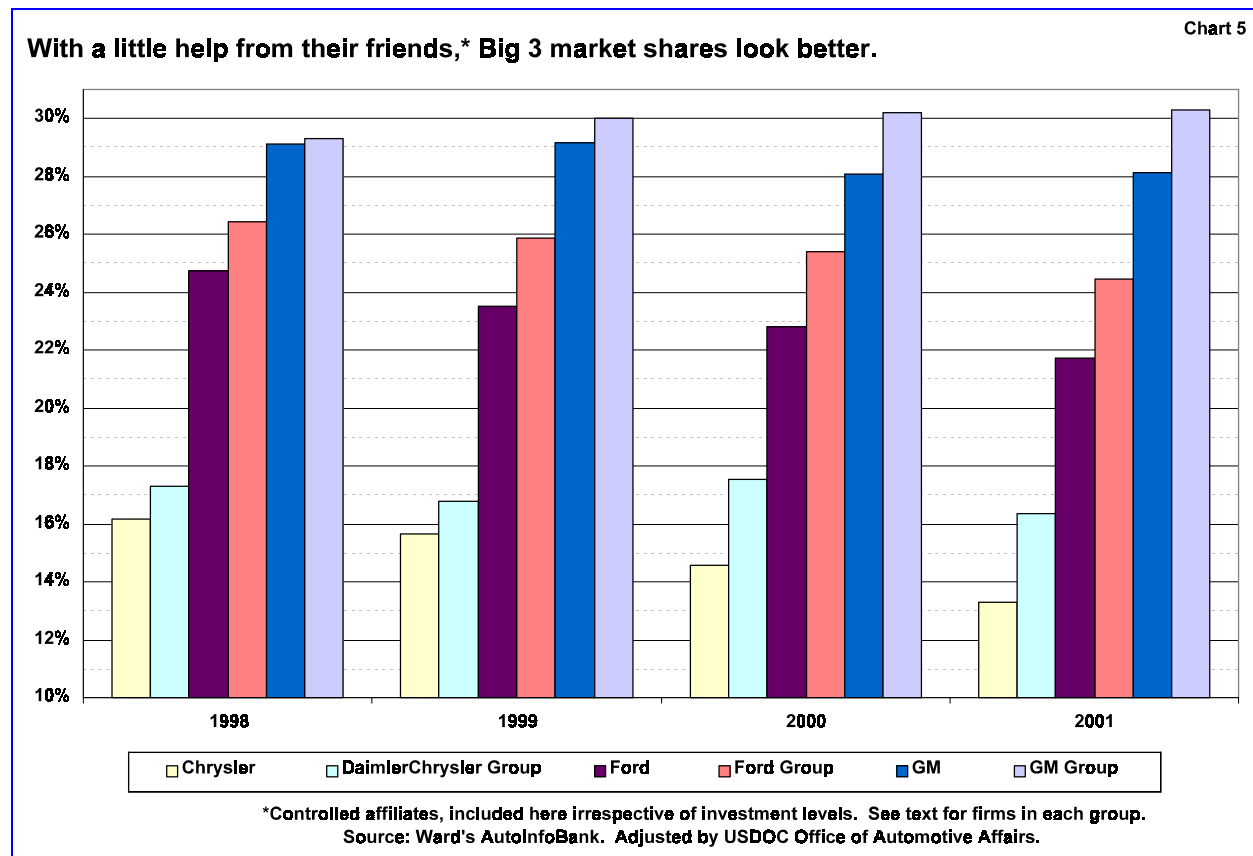
In the preceding discussion, market shares are based on the old-line, traditional brand affiliations⁷. While this is useful for showing the progression of market shares over time, it does not accurately reflect today's market. Chart 5 shows market shares for the American brands before and after accounting for their recent moves to merge with, or acquire control of other producers.⁸ Part of a worldwide trend, the consolidation taking place is the direct result of global production capacity that grew too fast.⁹ The net result is shrinking profits, wasted resources, and poorly performing investments. Estimates of the global excess range as high as 20 million units – the equivalent of 80 assembly plants. Until recently the excess capacity has proven to be exceedingly elastic, growing along with, or ahead of every increase in global demand, so that little progress was being made in narrowing the gap. When all is settled, there could be as few as eight manufacturing families, from a field that in the middle of the twentieth century numbered more than 100 firms. Whether there will be anything

⁷ Which is to say, the North American production of GM and Ford and the Chrysler Group.

⁸ The chart includes only those affiliates controlled by the companies. For Ford: Jaguar, Mazda, Rover, Volvo. For GM: Saab, Isuzu. DaimlerChrysler includes Mercedes, Chrysler, Mitsubishi.

⁹ Although some observers might assert that the problem is not one of excessive, irresponsible investments, but rather that markets haven't been allowed or encouraged to grow fast enough.

more than a small reduction in the world's unneeded manufacturing capability, however, remains to be seen.



Daimler-Benz and Chrysler triggered the most recent spate of global restructuring projects in November 1998. They stunned the automotive community by crafting a \$90 billion transaction that was the largest acquisition-merger ever undertaken in the industrial world. Chrysler, ranked seventh worldwide on the basis of production volume in 1997, and Daimler's Mercedes Benz, ranked fifteenth, created DaimlerChrysler AG (DCX), a German-registered corporation that became the world's fifth largest assembler. DCX trails GM, Ford, Toyota and Volkswagen, while displacing Fiat and Nissan. In 2000, it bought a legally controlling 34% interest in Mitsubishi Motors Corporation and a 10% share of Hyundai Motors, becoming that firm's single largest investor. DCX later increased its stake in Mitsubishi to 37% and affirmed its interest in absorbing the entire company, once it returns to profitability and reduces its debt.

Ford responded to DCX's first initiative by acquiring Volvo's automobile operations in 1999 and Rover in 2000, adding them to its existing international stable that includes a controlling

33% of Mazda, and 100% of Jaguar and Aston Martin. Hyundai successfully outbid Ford in late 1998 for ownership of Korea's second largest producer, Kia.

General Motors's reaction was to increase its share of Japanese truck producer, Isuzu, to 49% in 1998. This was followed in 1999 by doubling its share of Subaru to 20%. In 2000, GM increased its share of Suzuki to 20%, and completed its takeover of Saab Automobile, half of which it had purchased in 1989. Also in 2000, GM purchased 20% of Fiat Motors, the subsidiary of Fiat S.p.A. Between January 2004 and July 2009, Fiat has the right to require that GM purchase the outstanding balance of Fiat Motors at current fair market value. The original agreement specifies that the future price would be determined by investment banks retained by the parties. By the middle of 2002, GM expects to complete protracted negotiations to acquire a majority, controlling share of Daewoo Motors, having outbid both Ford and Hyundai in 2000 for the right to the acquisition.

While the industry's restructuring has slowed, since there are fewer prospects available, it is still not over. U.S. and foreign firms continue to look actively for acquisitions, mergers, and non-equity cooperative ventures that will help the participants to share and to reduce development costs, production expenses, and marketing overhead. When the dust finally settles, it is unlikely that there will have been any measurable negative impact upon the U.S. economy. For other countries, the prospects are not so sanguine. In particular, local vehicle assemblers in the emerging markets are not likely to remain economically viable, except with the protection of their host countries; and that portends clashes with other governments seeking to expand international trade.

And its not just the manufacturers that are evolving

Not only is the motor vehicle industry undergoing an evolution bordering on revolution, so too are the products they offer, and for much the same reasons: an imbalance between global capacity and demand, especially in key markets. The major manufacturers realize that if their largest markets aren't going to increase significantly any time soon, the only way to increase profits is to take market share from one's competitors. In fact, the 20-year trend line for the U.S. suggests that growth in the United States will average, at best, 1% annually for the next several years. From this comes the imperative to fracture the existing market into new segments, since being first in a new segment usually results not only in immediate sales and higher profit margins, but also produces the higher ongoing market share. Each manufacturer hopes to create a magical mix of never-before-seen features that boast not only greater practicality, price, and performance, but also more intriguing styling than anything else being offered.

Oddly enough, this drive to be different also is helping to eliminate the clear distinction that now exists between passenger cars and consumer-oriented trucks. Demand is growing rapidly for more upright, more versatile, more comfortable 'cross-over' vehicles that blend the best attributes of passenger cars with the carrying capacity and ruggedness of sport utility trucks. Adding momentum to this trend is the slowly emerging convergence between the federal government's safety and emissions standards for light trucks and passenger cars.

The first of the new breed of cross-over vehicles, built upon car platforms and "disguised" to appeal as civilized, luxury sport utility vehicles (although many look suspiciously like nothing more than tall station wagons), appeared in the offerings of the foreign affiliated manufacturers in 1997-98. Honda's CRV, Mercedes' M-Class, Subaru's Forester, and Toyota's RAV4 are early examples. New offerings have followed quickly, including the Ford Escape, Pontiac Vibe, DaimlerChrysler PT Cruiser, the Volvo Cross Country, and the soon to be released Subaru Baja. Ward's Automotive Reports recorded just 195,000 "Cross Utility" sales in 2000, but nearly 780,000 in 2001. Eventually, it seems, we will all be driving trucks. We just won't know it, or perhaps we will, but it won't really matter.

A second evolutionary force is the growing demand for "green" vehicles with significantly lower emissions and greatly reduced fuel consumption compared with today's typical vehicle. The public's response to the initial green offerings in 1997 – typified by GM's first-to-market all-battery EV-1 and Honda's similarly powered EV Plus – is best described as "underwhelming." Just 1,400 units in total were sold or leased during 5 years of effort. Even so, it is clear that a strategically significant market is developing for vehicles that successfully combine low environmental impact with outstanding operating economy, excellent comfort and performance, adequate range, and an acceptable price.¹⁰

The next step in the evolutionary chain of the green vehicle, hybrid power systems that combine small gasoline or diesel engines with battery packs and electric motors, is generating a better response. Honda was the first to bring this new breed to market, offering the 'Insight' in late 1999. A small two passenger vehicle reminiscent of Honda's mid-1980s CRX coupe, Insight generates impressive acceleration and 70 mile per gallon fuel economy. Toyota also sells a hybrid, a 4-door 5-passenger compact that returns 55 miles per gallon of fuel, called 'Prius,' In 2001, their second year on the market, sales of the two vehicles totaled 20,000 units. This spring, Honda will offer a four passenger hybrid-

¹⁰ Adding impetus are the requirements of California that mandate zero emission vehicles be available in 2003. In addition, regulations are now being prepared by the U.S. Department of Transportation to require significant improvements beginning in 2005 for the fuel economy of cars and light trucks. The current regulation, 27.5 mpg for cars and 20.7 mpg for light trucks, has not increased since 1995. Also being debated in Congress is a proposal to substantially increase through 2006, federal tax credits for buyers of battery, hybrid and fuel cell powered vehicles.

powered Civic sedan with a 51 mpg rating. Ford plans to sell a hybrid version of its “Escape” SUV in 2004, the same year that GM expects to have full size hybrid pickups available. The Chrysler Group expects to have a hybrid pickup on the market by no later than 2005.

However, as is typical with leading edge technologies, the hybrid electric’s momentum already may be running out of juice. It obviously is a short-term, interim technology with a limited future. The industry is quickly and enthusiastically turning its attention toward much more promising “fuel cell” power systems. Similar in concept to the technology employed by NASA to provide electric power on today’s space shuttle, fuel cells produce electricity through a chemical reaction involving hydrogen and oxygen. The electricity energizes motors that turn the vehicle’s road wheels. The concept is so promising, that an earlier joint project (the Partnership for a New Generation of Vehicles, PNGV) begun in 1994 between the American industry and the U.S. government to develop a five passenger, low impact, high mileage motor vehicle, is giving way to the ‘FreedomCAR’ project, recently announced by the U.S. Department of Energy.

Unveiled this January, FreedomCAR will focus on perfecting fuel cell technology, attempting to drive down the 3-to-1 cost advantage now enjoyed by the conventional gasoline engine-transmission powertrain. The target is a power package no more expensive to produce, no more complicated to service and refuel, and no less powerful – but with significantly better fuel economy (perhaps, 100 miles per gallon equivalent) and much lower emissions. In fact, if pure hydrogen is used, the only byproduct will be potable water vapor. Because fuel cells involve no moving parts and electric motors just a few, compared with hundreds in a conventional engine and transmission, fuel cell vehicles (FCVs) promise greater reliability and longevity, and greatly reduced manufacturing complexity. Most heavy foundry work and complex machining operations will be eliminated, and the industry’s consumption of aluminum, steel, and cast iron will shrink.

“Proof-of-concept” FCVs already have been assembled not only in America, but also in Europe and Japan. A small number of FCVs will appear on the American road in 2004 for demonstration purposes. These will be followed by a few thousand more, perhaps 4,000-5,000, between 2008-2012, placed in the hands of fleet operators who can arrange their own refueling service. Volume production for the mass market won’t happen for some time, perhaps not before 2015, when as many as half a million FCVs could be traveling American roads. Yet to be solved are problems involving range of travel, ease of refueling, packaging, and cost.

General Motors provided a glimpse of the potential offered by the FCV concept during this January’s North American International Auto Show, unveiling its “AUTOnomy” to a

stunned Detroit audience. Resembling nothing so much as a four-seat Le Mans race car perched atop an overgrown skateboard, AUTOnomy demonstrates the freedom of design possibilities when conventional propulsion systems no longer dictate vehicle architecture. The skateboard platform contains the entire fuel cell electric power generator in a plate just six inches thick. Each corner of the platform is supported by a wheel driven by an electric motor. Control of the brakes, suspension, steering, electric motors, and the power generator, is accomplished entirely with “drive-by-wire” electronics, rather than by mechanical and hydraulic linkages. The passenger capsule – its shape totally unconstrained by mechanical necessity – sits on the platform, easily removed and quickly replaced for maintenance or whim. GM expects to have a fully functional prototype on the road by no later than 2007.

The final market development to note is the continuation of the two year old evolution of “telematics,” the convergence of the automobile – not with trucks – but with electrons. Automakers are rushing to incorporate into their vehicles everything the electronic information age has to offer, including global positioning devices, wireless internet web connections, remote emergency assistance, remote engine diagnostics, and ultra-sophisticated on-demand entertainment systems. Producers, claiming that vehicles aren’t just about transportation anymore, are creating not only living rooms on wheels, but the home office as well. This trend probably will not end until it has merged with the decades-old “smart highway” development project, creating self-guided mobile entertainment lounges and porta-offices – the internet portal become the portable internet.

The internet revolution will revolutionize auto production

The electronic revolution has important implications for the production of motor vehicles. Mass production was hailed originally as the most effective way to lower manufacturing costs, generating great efficiency through the repetitive production of vehicles using components that were exactly interchangeable. Unfortunately, mass production also virtually guarantees that unwanted vehicles will be efficiently produced, often in great quantities, because the mass production methodology cannot guarantee demand for the product being assembled.

The internet offers a way to solve this problem. In the future, individual customers will specify the exact product they wish to purchase, before even the smallest component is ordered by a vehicle assembler. Parts suppliers and assemblers will no longer have to stockpile products. There will be no need to entice buyers to purchase vehicles that they may not really want. Dealers will no longer serve as inventory buffers. Parts manufacturers will no longer be parts manufacturers, but become module suppliers, not

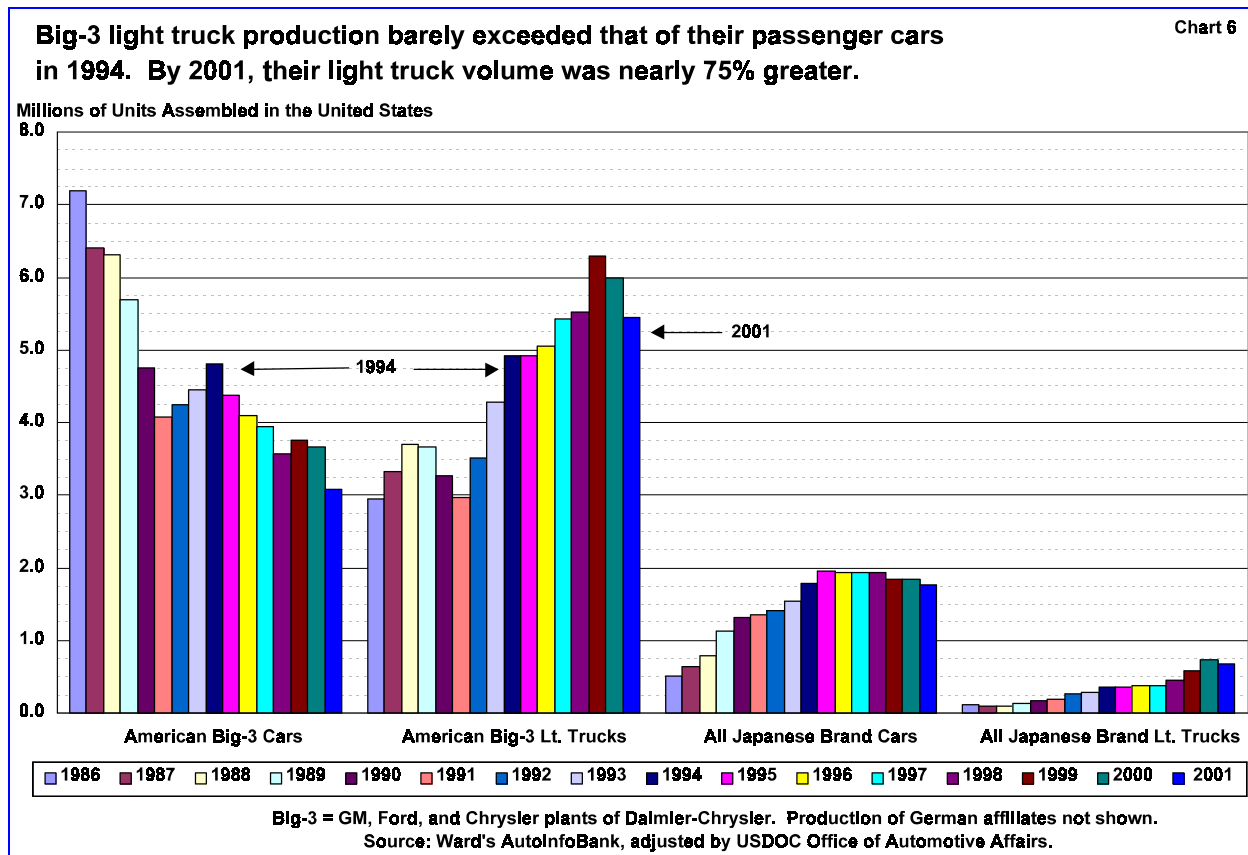
only engineering, but also manufacturing and delivering complete sub-assemblies to the vehicle assemblers just in time to be incorporated into the vehicle. Vehicle manufacturers will evolve from actual to “virtual” corporations, investing less in the infrastructure of vehicle production and more in the intellectual capital and network needed to create and promote unique vehicle brands.

Ironically, the internet is providing a methodology for moving the industry forward by moving it backward – back from the mass production of pre-configured vehicles, and forward to the custom assembly of vehicles one-at-a-time, in the “bespoke” fashion upon which the industry was originally established more than 100 years ago. The efficiencies inherent in this newly revised old approach already have been demonstrated clearly by the computer assembly industry. Savings in the auto industry will be nothing short of astounding, perhaps enabling a 25 percent reduction in the retail price of finished vehicles. We are entering a new age of the automobile; one that replaces mass production with mass customization.

But, before that happens...

Mass production is still the norm in the United States, and it generates a tremendous amount of revenue for the manufacturers. The U.S. Census Bureau’s Annual Survey of Manufacturers reports that vehicle producers in the United States booked light truck shipments worth \$107.2 billion in 1997, plus an additional \$93.2 billion for cars, a grand total of over \$200 billion. In 2000, the total was \$217 billion. Light truck shipments accounted for nearly 56%, or \$122 billion. U.S. production reached an all time high of 12.6 million cars and light trucks in 1999, with a combined ex-factory value of \$240 billion. In 2001, volume fell to 11.2 million units, a decline of nearly 10% from the previous year.

Output in the American Big 3 plants in 2001 fell 12% to 8.5 million vehicles, their lowest level since skidding to 7 million units in 1991. U.S. production by the Japanese affiliated producers peaked at 2.6 million units in 2000 before slipping to 2.4 million units in 2001. Volume has risen steadily since 1986, when their output totaled 617,000 units. Still small in relative terms, U.S. production by the two German affiliates is expanding rapidly. Assembling nothing here in 1993, volume reached 199,000 units in 2001, an increase of 21% for the year. Because most of the manufacturers did a stellar job of managing production down, rather than building stockpiles up during the market’s decline last year, and because sales are holding up so well in the first quarter of this year, 2002 appears to be heading for an annual gain in output of about 2%. This would yield a production volume of about 11.4 million cars and light trucks.



In 1986, the American Big 3 produced 7.2 million cars in the United States, but just 3 million light trucks. (See Chart 6.) In 1994, the mix was nearly equal, with a slight edge in favor of light trucks. By 2001, the Big 3's light truck volume was nearly 75% larger than their passenger car volume, reaching a total of 5.4 million units. Car volume fell to 3 million units, matching that of light trucks in 1986. The American brands probably will produce at a healthy rate in the first half of 2002 to rebuild their inventories which they let dwindle during last fall's market decline. Nonetheless, they may finish 2002 with no gain in output, slowing their line speed and eliminating shifts in order to balance production with what likely will be reduced shares of a smaller market.

The local Japanese product mix (spread among eleven plants in nine states controlled by seven firms), is still heavily skewed in favor of cars; 83% of their volume in 1986, compared with 72% in 2001. The differential will shift rapidly over the next few years, however, as Japanese plants continue to expand production of large SUVs, vans, and pickups tailored explicitly for the U.S. market. In 1986, Japanese affiliated plants in North America supplied 12% of all Japanese branded vehicles sold in the United States. Their North American sourced share reached 67% in 1996 before eventually falling to 64% in 2001, having declined in every year in between (except for 1998 when it rose briefly to 65%). The

slippage can be traced primarily to U.S. market demand rapidly outgrowing increases in the Japanese manufacturers' North American capacity. To remedy this problem, all of the major Japanese producers now are building or expanding plants within the region, primarily in the United States.¹¹ Japanese capacity in the U.S. now is approximately 3.4 million cars and light trucks. It could reach 4.3 million units in 2004, according to estimates prepared by Ward's AutoInfoBank.

Indeed, while there is a superabundance of motor vehicle plant capacity around the globe, that hasn't stopped firms from expanding in the United States. Industry data, as well as that published by the Federal Reserve Board (FRB), show that U.S. capacity has grown steadily for the past several years. The FRB reports its capacity index rose from 125 in January 1986 to 204 in February, 2002.¹² The Census Bureau's annual survey confirms this trend. Between 1997 and 2000, car and light truck producers reported investing nearly \$19 billion in the United States for new industrial machinery, equipment, and the structures to house them. Some of this investment was used to replace obsolete facilities, but much of it went for creating additional, more efficient capacity.

Industry data show that average vehicle assembly plant capacity utilization rates¹³ in the United States have routinely exceeded the 80 percent level that many industry observers believe to be optimal. In 2000, the average utilization rate was 94% for car plants, while overtime and extra shifts helped lift the average light truck assembly plant utilization rate above 103% of rated straight time capacity. Unfortunately, these are mathematical averages that hide large differences among individual plants. Some are grossly underutilized, while others run at herculean rates that are neither sustainable, nor conducive to maintaining product quality. The FRB also measures plant capacity utilization, reporting that car and light truck average assembly plant utilization was 84% in December 2001. It had dipped to 73% in October. Chart 7 provides estimates of the variances between the American and Japanese brand manufacturers, and between their car and light truck plants.

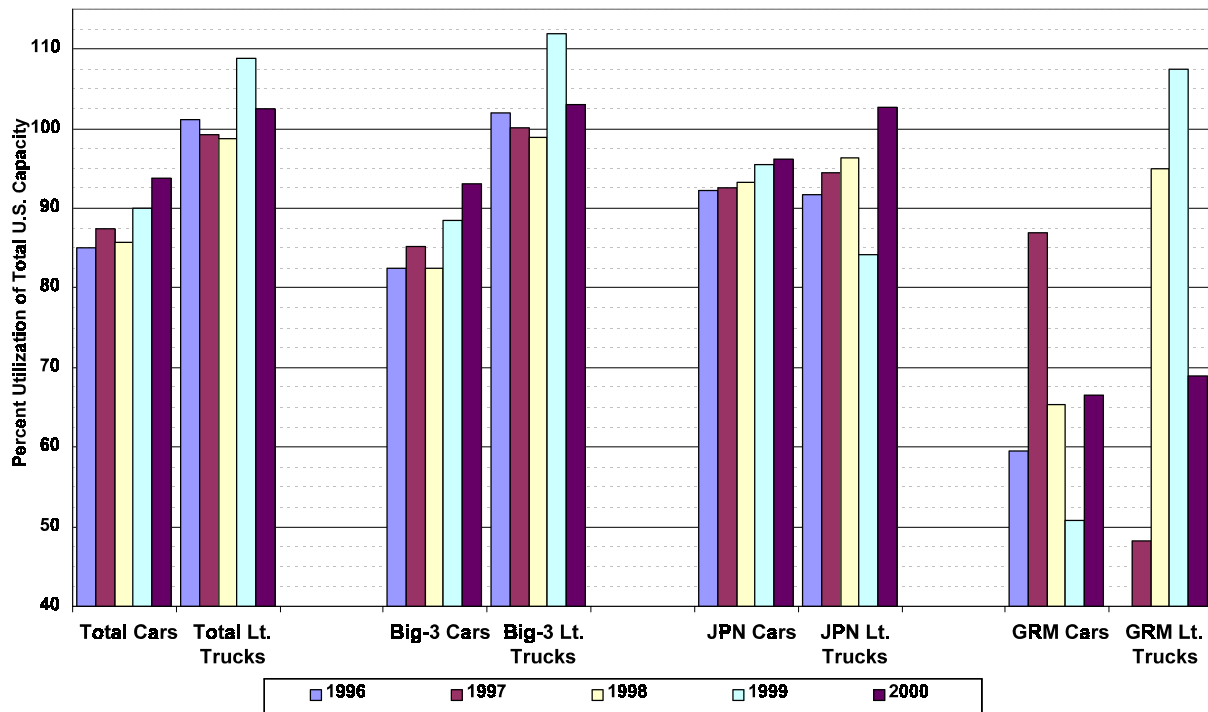
¹¹ Recent activity includes a \$930 million Nissan plant in Canton, MS that will build large SUVs and pickups. Due on line in 2003, capacity will be 250,000 units. Honda opened a new plant in Lincoln, AL in December 2001 with the capacity to build 120,000 minivans per year. Plant cost was \$580 million. Honda will expand capacity by an additional 30,000 units by the end of 2002. Toyota began production in its new \$1.6 billion Princeton, IN light truck plant in 2001. Capacity is set to double to 300,000 units in 2003.

¹² The Federal Reserve Board defines capacity as "sustainable potential output," expressed as a percentage of actual output in 1992. It has seldom declined in the period under review. See the FRB's Series G-17 Report, Industrial Production and Capacity Utilization for details.

¹³ A ratio expressing the volume of vehicles actually produced in a year, relative to a plant's designed capability to assemble them.

Overtime and extra shifts enable plant capacity utilization to exceed "straight time" capacity ratings.

Chart 7



Source: Automotive News Annual Market Data Book

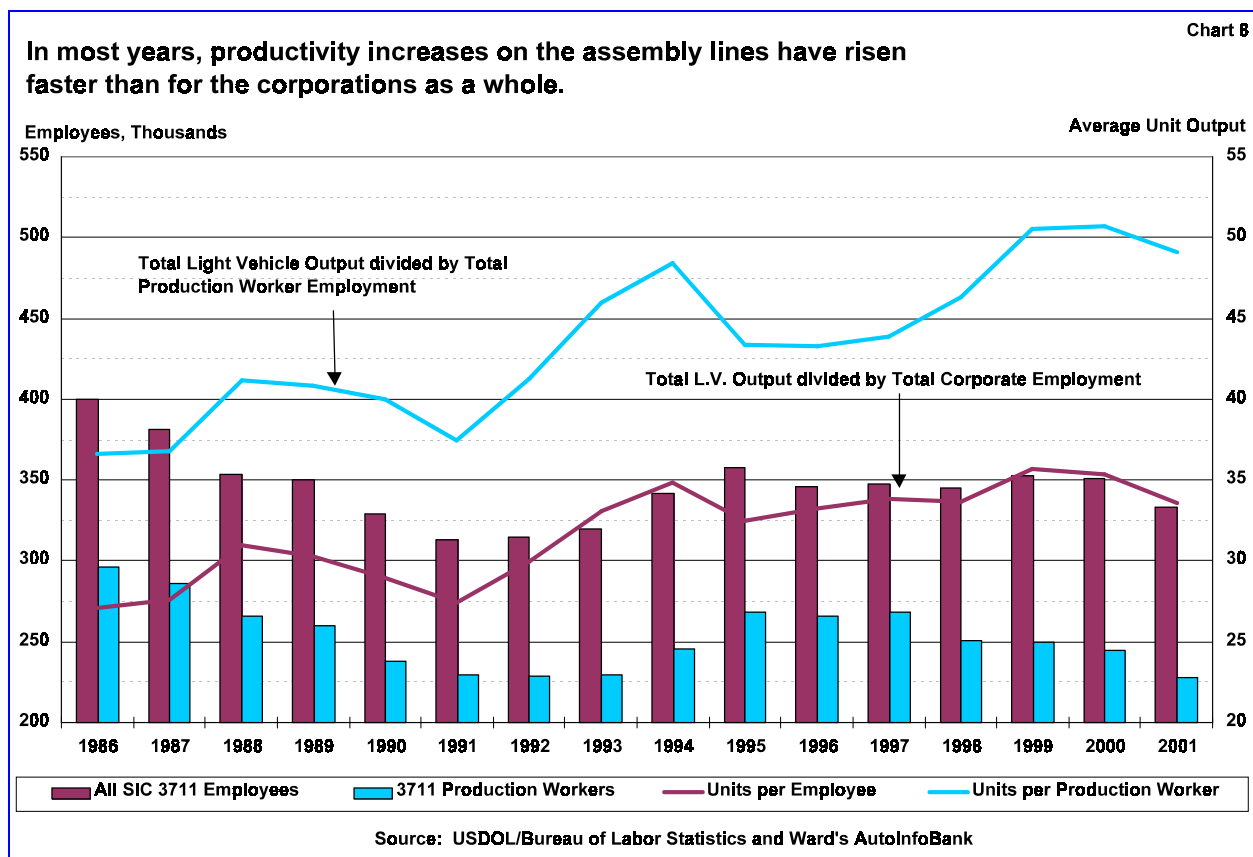
Looking to the future, it is clear that the American Big 3 will continue to focus attention on eliminating underutilized capacity. They also will not hesitate to add capacity for new products, designing those plants to more easily shift from one product to another, be it a car or a light truck. They will remain keenly focused upon driving costs down by, among other techniques, sharing more components across more vehicle lines, and by continuing to raise productivity. They will continue to raise product quality, as well as the public's consciousness of their improved product quality. They will renew efforts to introduce better designed new products more quickly, and will employ more flexible manufacturing, marketing, and management methods to get it done. The attitude in Detroit is that accomplishing all of this may be difficult, but it is not at all impossible.

Excess capacity, improved productivity yields employment loss

The U.S. Bureau of Labor Statistics reports that employment in the domestic motor vehicle assembly industry (SIC 3711) averaged 350,600 individuals per month during 2000, but just 333,000 in 2001, a decline of 5%. The industry employed 400,000 in 1986. The American Big 3 have been selling their parts operations, accounting for some of the decline; productivity increases and canceled line shifts account for the balance. In 2001, they also

began making permanent adjustments to their employment levels to reflect their declining share of the domestic market. Reductions by the end of 2003 could total more than 70,000 individuals worldwide, accompanied by a number of permanent plant closings, in Canada, the United States, and in Europe.

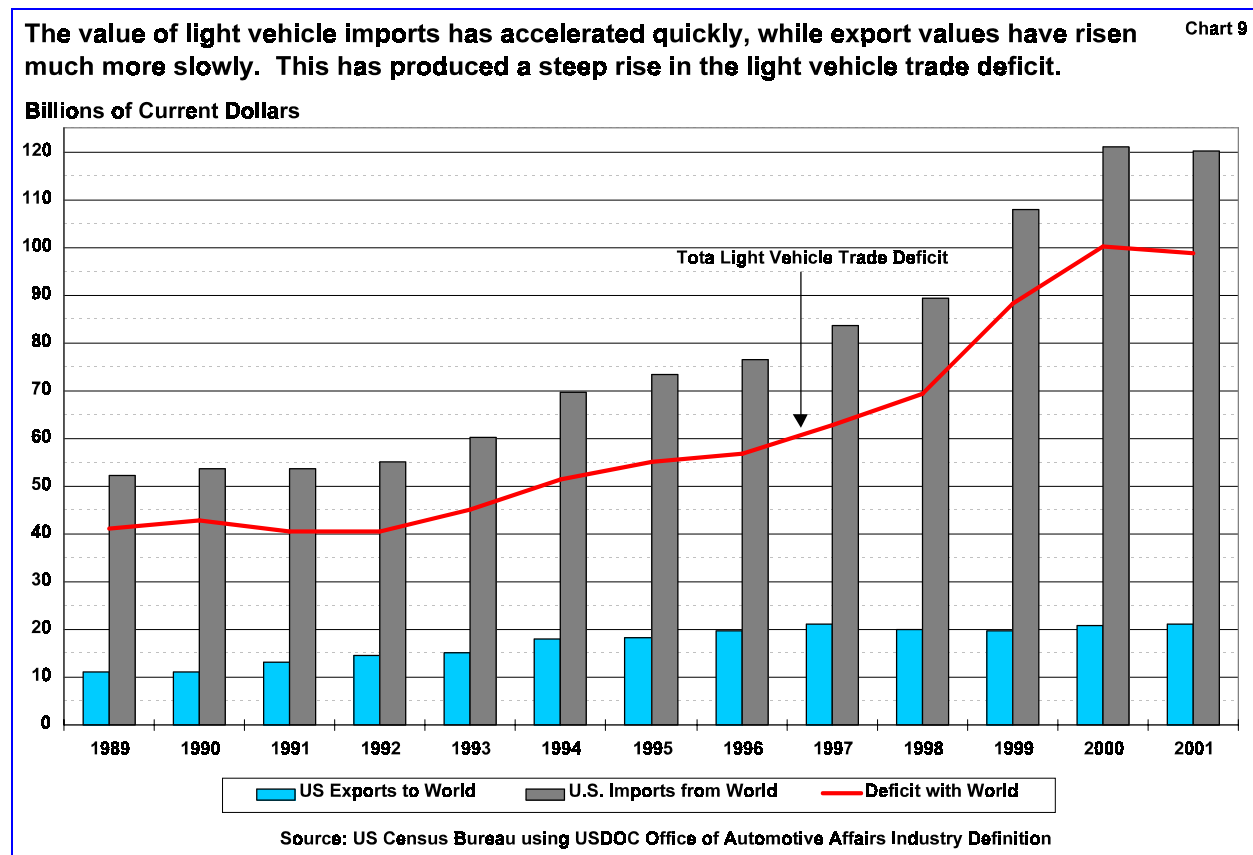
Chart 8 points out that while productivity gains, measured as units of vehicles produced per production worker, have increased sharply, the results have not been as impressive when all employees are included in the measure. Output grew from 37 vehicles per hourly employee in 1986 to over 49 vehicles in 2001, an improvement of 81%.



When salaried workers (management, engineers, etc) are factored in, the result is a gain of just 26% on an absolute increase of seven units per employee. The average yearly rate of improvement over the past five years for production workers was 2.6%. With salaried workers added, the average yearly rate of improvement for the period falls to 0.2%. These numbers suggest that the manufacturers might further improve their overall performance by focusing more carefully upon improving their “back office” productivity.

Trade matters

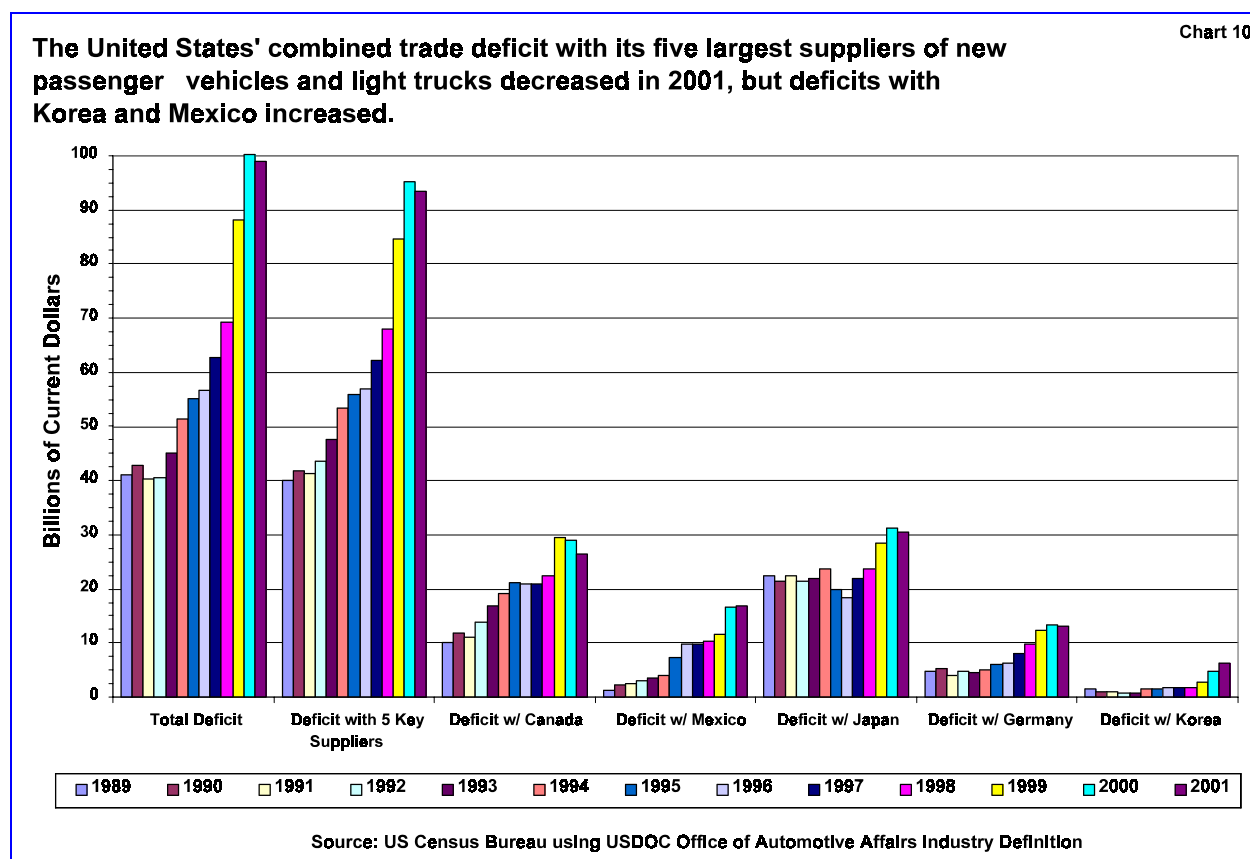
The vastness of the American market and the immense profits that have been generated here have provided very little incentive for local producers to export.¹⁴ Moreover, the vehicles they design to suit the wide open spaces and low energy expenses of the American market, hold little appeal to buyers in most other countries. On the other hand, the vastness of the American market and the immense profits that have been generated here, coupled with buyers that are highly receptive to the products of other nations, provides a great deal of incentive for foreign manufacturers to enter the American market. The result, not



¹⁴ U.S. sales of cars and all classes of trucks combined totaled 17.5 million units in 2001, exceeding that of any other single country or block of countries, including Western Europe. In 2001, 15 West European markets together purchased 17 million cars and trucks, while the next largest market, Japan, sold 5.9 million new vehicles. U.S. Department of Transportation data shows that the United States has the world's largest pool of registered automobiles. In 1999, 132.4 million cars were registered in the USA, while Japan had 50 million registered cars; Germany, 42 million cars. Measured on a per capita basis, however, the differences are not so significant. The United States averaged 480 cars per 1,000 persons. Japan averaged 395 cars. Germany's average was larger than either; 511 cars per 1,000 members of the population. The U.S. registered truck pool also was larger, 83 million, compared with 21 million and 4.4 million for Japan and Germany. However, because of the larger number of light trucks in the mix, the U.S. outdistances both countries in per capita distribution, averaging 302 per 1,000 persons compared with 165 for Japan and 53 for Germany.

surprisingly, is that the American Big 3 now are suffering the greatest competitive pressure in their history.

Also not surprisingly, the United States suffers the world's largest deficit in light vehicle trade. The good news, shown in Chart 9, is that after hitting an all time high of \$100 billion in 2000, the deficit actually declined for the second time since 1989, falling by 1% in 2001 to \$99 billion.¹⁵ More good news: The reduction wasn't just because of a decline in imports; U.S. export value reached \$21 billion, their highest level ever. (Chart 10) While deficits with Mexico and Korea increased, they declined with the other top five suppliers. Nonetheless, today's current deficit is nearly 2 ½ times as large as the deficit in 1989.



Last year, the United States had a deficit in its balance of trade with every one of our 16 largest suppliers. Trade with Canada and Mexico represent almost half of the total. Despite government efforts to redress unfair trade barriers around the world, there is little reason to

¹⁵ The deficit slipped nearly 6% in 1991, the only other year of decline during this period.

believe that the United States will generate a surplus in its motor vehicle trade any time soon.¹⁶ OAA's analysis of recent trends suggests that light vehicle imports will grow about 10% to \$132 billion in 2002, while exports will show no growth, matching last year's total of \$21 billion. The result will be a 12% increase in the deficit to about \$111 billion.

Today's imbalance primarily is the result of an unusually strong, sustained domestic market that has grown rapidly for more than a decade, serving as a virtual magnet for imports. Chart 11 shows this synchronous nature. The situation has been exacerbated by the globalization of the auto industry and by other contributory causes, especially government policies in Canada and Mexico that forced U.S. producers to add plant capacity in those countries and to export from those plants, in order to sell there.

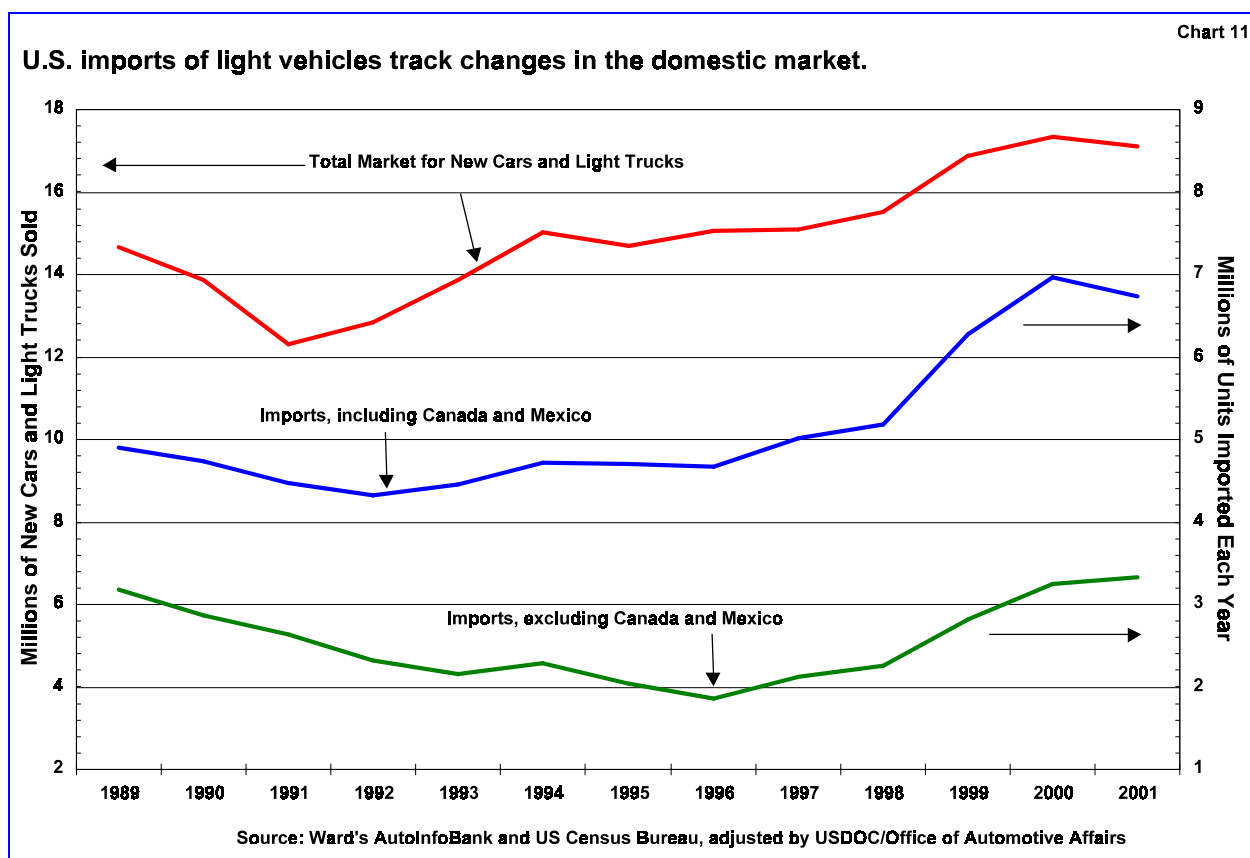
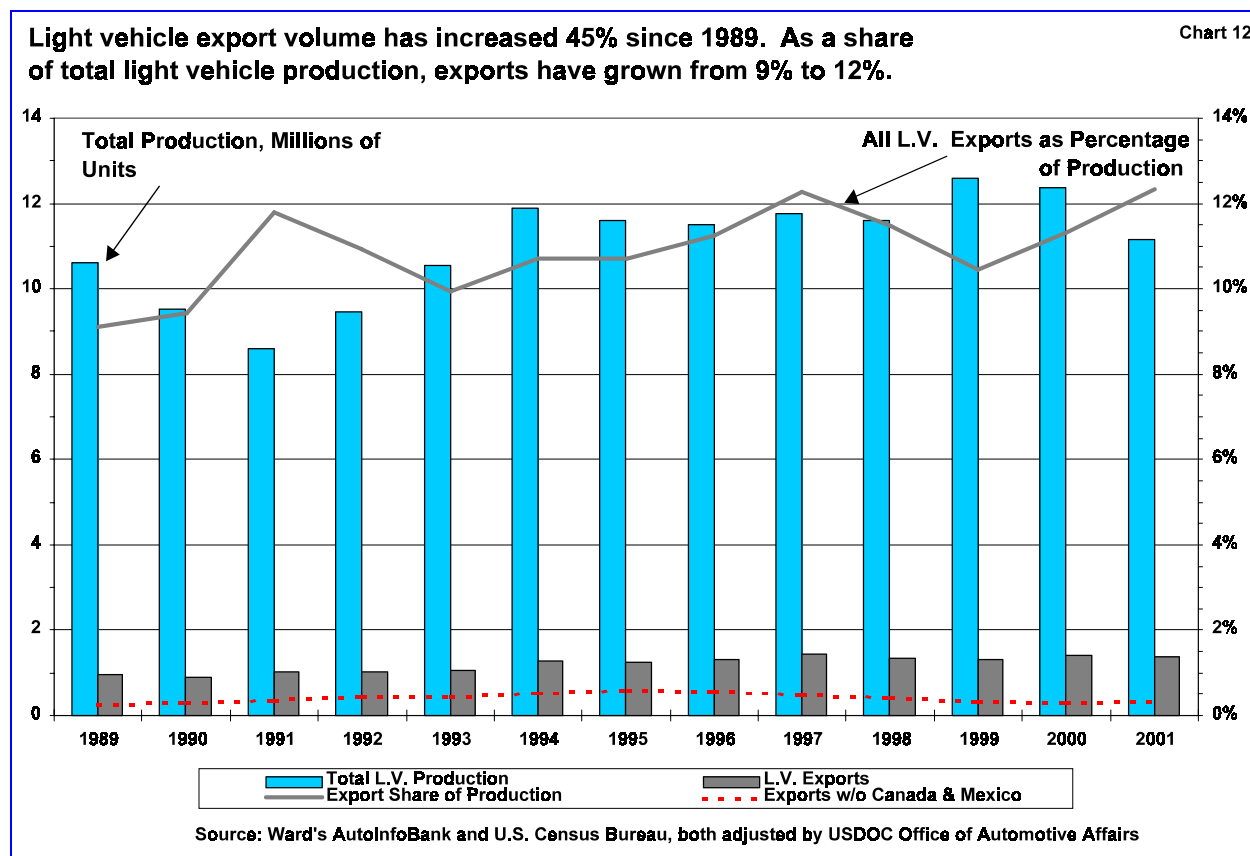


Chart 12 shows that total unit exports of new passenger cars and light trucks from the United States grew by nearly 43% between 1989 and 2001, almost reaching a volume of 1.4 million units. As a share of light vehicle production, exports increased from 9% to 12%.

¹⁶ The United States is no stranger to international trade in motor vehicles. Last year we imported them from 35 countries, but U.S. shippers also exported passenger vehicles and light trucks to 185 countries.



However, if shipments to Canada and Mexico are excluded, the gains are more modest – growth is just 22%, reaching 307,000 units. As a share of production, the increase would be reduced to just three-tenths of a point, producing a 2.7% share.

The five leading markets for U.S. exports (Canada, Mexico, Germany, Saudi Arabia and Japan) generated \$18 billion in sales in 2001, 86% of the total value of all exports of this category. In 1989, these markets accounted for 80% of the market. Although shipments to Canada slipped over 10% in 2001, it still accounted for 54% of all U.S. exports (\$14.4 billion) of these products. Mexico was not among the top five destinations in 1989, nor even among the top 20, being our 22nd best market that year. By 1997, Mexico had displaced Japan as our second best market, and remains there today with a 15% share. Exports to Mexico grew 49% in 2001 to a total of \$3.8 billion.¹⁷ Japan was our second best market between 1994 and 1996, and third best in 1997. Between 1998 and 2000, it placed fourth behind Germany. In 2001, Japan slipped to fifth place, displaced by Saudi Arabia, another major long term market for U.S. exports. Shipments to Saudi Arabia jumped 35%

¹⁷ See also the NAFTA discussion, which follows this section.

in 2001 to \$771 million, while shipments to Japan fell 27% to \$520 million. Appendix Table 1 provides a list of the ten largest export markets in 1989, 1995, and 2001.

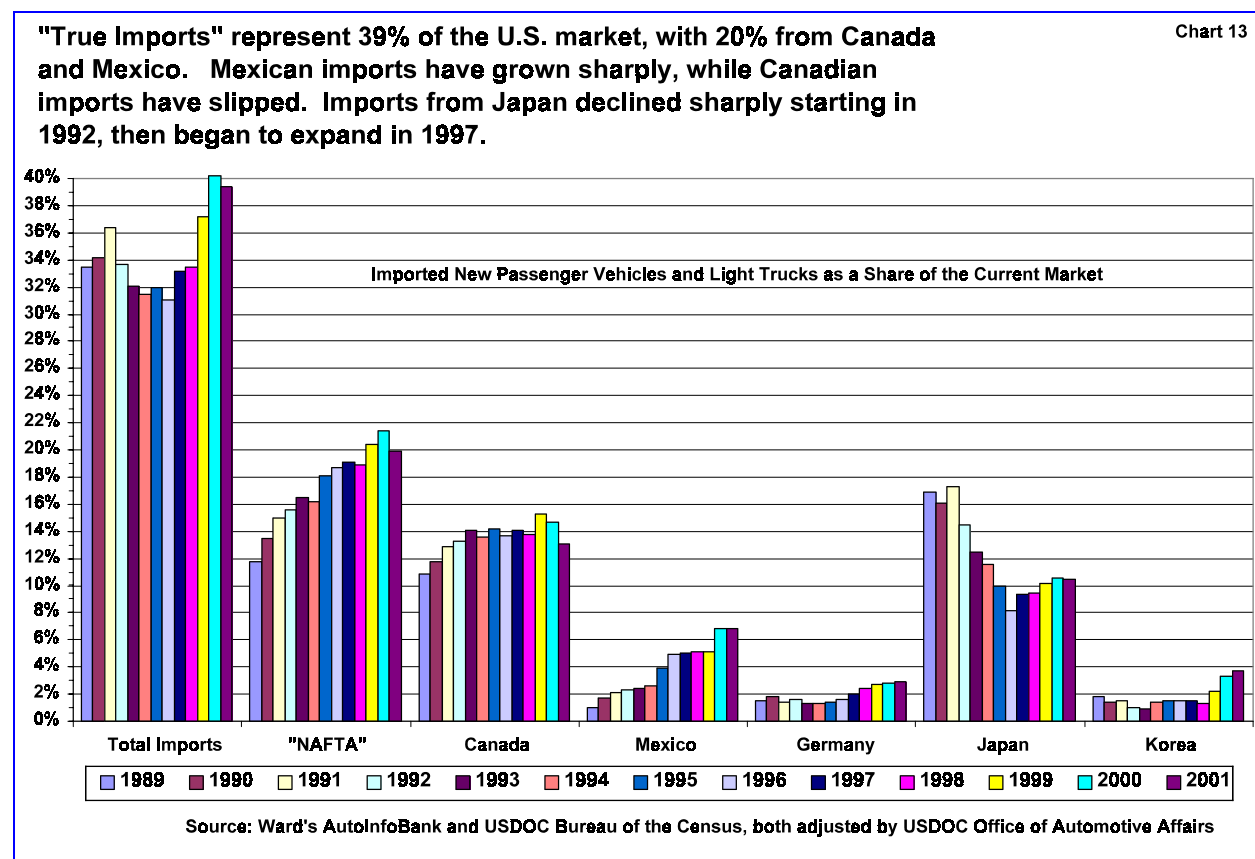


Chart 13 shows that “true imports”¹⁸ reached a record 40% of the 2000 market for new passenger vehicles and light trucks, before declining by one percentage point in 2001. Import value also reached a record \$121 billion in 2000, before falling to \$120 billion. The United States’ top five suppliers have changed very little since 1989, accounting for over 90% of all imports of these products. Canada and Japan were the first or second largest suppliers in every one of these years. In 1990, Mexico moved ahead of Sweden as fourth largest, and swapped with Germany in 1995 for third position, where both remain today. Korea broke into the top five in 1994, slipped behind Sweden in 1995, then returned to fifth largest in 1996, a position it has held consistently since then. Appendix Table 2 provides a list of the ten largest suppliers in 1989, 1995, and 2001.

¹⁸ True imports as a share of the total market is an approximation of import penetration, necessitated by manufacturers not identifying in their sales data the actual source of their NAFTA produced “domestic” vehicles. (Some models are produced in two countries.) Vehicles reported in official trade data may have been imported in one year, but sold in another. Some imports may not be sold on the retail market. Also see footnote No. 2.

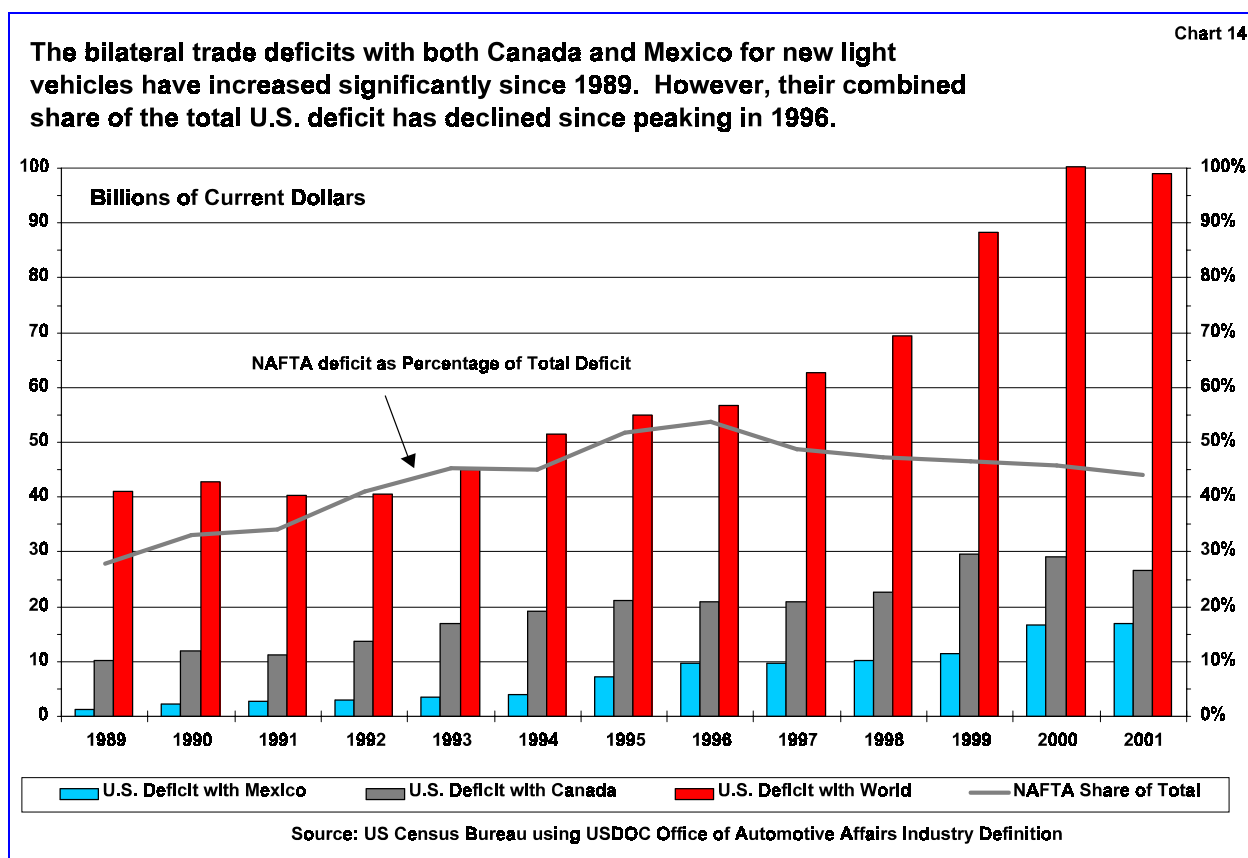
Of the top five suppliers in 2001, Germany, Korea, and Mexico increased shipments to the USA. Imports from Germany were up 3%, reaching \$14.9 billion, a record. Korean-sourced imports also posted a record, jumping 31% to \$6.3 billion. Mexico shipped 2% more, reaching \$20.6 billion. This follows a 45% increase in 2000. The greatest gains, however, were posted by Austria, which increased exports to the USA by over 1,000% to \$653 million, and South Africa, up 996% to \$256 million. Both jumps were the result of decisions by DaimlerChrysler and BMW to redirect some of their volume from their factories in those countries to the United States. U.S. imports from Canada declined 9% to \$38 billion, on the heels of a 2% decline in 2000. Most imports from Canada and Mexico are sourced from GM, Ford, and Chrysler Group plants in those countries. The Big 3 also account for most of the U.S. exports to those countries.

After NAFTA

In 1994, the United States, Canada, and Mexico entered into an historic undertaking to liberalize trade among the three nations. In the years following implementation of the North American Free Trade Agreement, shipments of new passenger vehicles and light trucks between the United States and its two partners have grown tremendously. U.S. exports and imports involving both countries reached a peak of \$77.7 billion in 2000, before declining to \$73.5 billion last year. Cross border shipments in 1993 totaled \$36.5 billion. Most of the growth in trade during this period is the result of increased imports by the United States, which have risen from \$28.4 billion to \$58.5 billion, a jump of 106%. U.S. exports to both nations increased 86%, rising from \$8 billion to \$15 billion. As Chart 14 shows, the United States has continued to experience deficits with both countries. However, their combined share of the U.S. global deficit in these products has declined, dropping from a high of 54% in 1996 to 44% in 2001.

Most trade in automotive products between Canada and the United States was liberalized by two bilateral agreements enacted before the NAFTA agreement was implemented.¹⁹ Consequently, little of the growth in trade between the two countries since 1993 can be attributed directly to the NAFTA agreement. Bilateral trade with Canada in these products, \$32.8 billion in 1993, reached \$49.4 billion in 2001. U.S. exports increased by 43% to \$11.4 billion, while imports from Canada grew 53% to \$37.9 billion.

¹⁹ The Canada-U.S. Automotive Products Trade Agreement (APTA) in 1965, and the Canada-U.S. Free Trade Agreement (CFTA) in 1989.



Before NAFTA was enacted, exports to Mexico from the USA were artificially constrained by a host of measures enacted by the Mexican government. In 1993, our shipments of new passenger vehicles and light trucks totaled just \$95 million. They jumped 500 percent in 1994, the first year of the agreement, reaching \$580 billion. By the end of 2001, U.S. exports to Mexico totaled \$3.6 billion, 38 times larger than shipments in 1993. By 1997, Mexico displaced Japan as our second most important international market. It retains that position today, trailing only Canada.

Imports from Mexico have grown rapidly since the agreement was signed, jumping 470% from 1993 to a total of \$20.6 billion in 2001. Because the U.S. border was already open to Mexican imports, it would be a mistake to attribute this surge to the NAFTA agreement. In fact, of the two increases, only the growth in U.S. exports can be directly credited to the agreement, since the only change in cross border market access has been the removal of Mexican restrictions that constrained U.S. exporters. For example, a Mexican requirement that producers assemble vehicles in Mexico and export a certain percentage of them in order to import vehicles into Mexico was immediately phased out for commercial vehicles, and will be entirely eliminated for passenger vehicles on January 1, 2004. Strict quotas, high tariffs, and minuscule import market share allocations that applied to motor vehicle imports

from the United States have been eliminated. Mexican content requirements have been substantially curtailed and will be eliminated entirely by January 1, 2004.

The point bears repeating: NAFTA is responsible for a significant surge in U.S. automotive exports to Mexico. Conversely, our imports from Mexico would have risen even in the absence of the agreement, since the U.S. motor vehicle market – already open to Mexico – has experienced an unprecedented period of strong sales (see Chart 11) that happens to coincide with implementation of the agreement. The strength of the domestic market, not the agreement, is the single factor “responsible” for drawing in imports of motor vehicles from all over the world.

Conclusion

Although 2002 opened with most observers expecting that both the motor vehicle market and the economy would continue to contract, the first three months have been very positive. Annual sales of not less than 16 million vehicles are now the common expectation. Some are suggesting 16.5 million. Nonetheless, the year will be filled with painful adjustments for some manufacturers, even as others expand their presence. In the very near future, the auto industry as we know it today will have been completely transformed by the relentless adoption and application of technology, most of it bred of the electron. Fewer competitors, but increased competition; lower manufacturing and distribution costs; reduced employment made possible by greatly increased productivity; different and more efficient propulsion systems; enhanced vehicle capabilities and new styling packages; all are on the horizon. Through it all, and as it has been for over a century, the automobile industry will continue to function as an engine of economic wealth for the nation.

Appendix Table 1 Top 10 Markets for U.S. Exports of New Pass. Vehicles & Light Trucks Billions of Dollars					
1989		1995		2001	
Canada	7.840	Canada	9.595	Canada	11.416
Taiwan	.704	Japan	2.716	Mexico	3.598
Saudi Arabia	.366	Taiwan	.953	Germany	1.739
Japan	.366	Germany	.560	Saudi Arabia	.771
Germany	.328	Brazil	.405	Japan	.520
France	.282	Saudi Arabia	.397	United Kingdom	.488
Kuwait	.218	Mexico	.332	Kuwait	.260
Switzerland	.167	Belgium	.277	Australia	.217
Sweden	.136	Hong Kong	.275	Belgium	.214
Finland	.076	United Kingdom	.256	South Africa	.131
World Total	11.173	World Total	18.159	World Total	20.995
Source: U.S. Census Bureau using Office of Automotive Affairs industry definitions					

Appendix Table 2 Top 10 Suppliers for U.S. Imports of New Pass. Vehicles & Lt. Trucks Billions of Dollars					
1989		1995		2001	
Japan	22.689	Canada	30.857	Canada	37.946
Canada	18.004	Japan	22.582	Japan	31.040
Germany	5.021	Mexico	7.579	Mexico	20.571
Sweden	1.649	Germany	6.612	Germany	14.893
Korea	1.592	Sweden	1.766	Korea	6.342
Mexico	1.294	Korea	1.655	United Kingdom	2.664
United Kingdom	.937	United Kingdom	1.419	Sweden	2.173
Belgium	.385	Belgium	.689	Belgium	1.076
Brazil	.282	Italy	.067	Austria	.653
Italy	.263	Australia	.017	Brazil	.624
World Total	52.206	World Total	73.253	World Total	120.010
Source: U.S. Census Bureau using Office of Automotive Affairs industry definitions					